



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

## NOTICE OF ALLOWANCE AND FEE(S) DUE

82346 7590 11/30/2009

James R. Foley  
Trexler, Bushnell, Giangiorgi, Blackstone & Marr,  
105 West Adams Street  
36th Floor  
Chicago, IL 60603

EXAMINER

JONES, HUGH M

ART UNIT

PAPER NUMBER

2128

DATE MAILED: 11/30/2009

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/736,386

12/15/2003

Bruce Whitefield

03-1345

6227

TITLE OF INVENTION: METHOD FOR CALCULATING HIGH-RESOLUTION WAFER PARAMETER PROFILES

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1510	\$300	\$0	\$1810	03/01/2010

**THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.**

**THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.**

### HOW TO REPLY TO THIS NOTICE:

#### I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

**IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.**

# **PART B - FEE(S) TRANSMITTAL**

**Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE  
Commissioner for Patents  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
or Fax (571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

82346 7590 11/30/2009

**James R. Foley**  
Trexler, Bushnell, Giangiorgi, Blackstone & Marr,  
105 West Adams Street  
36th Floor  
Chicago, IL 60603

## **Certificate of Mailing or Transmission**

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/736,386	12/15/2003	Bruce Whitefield	03-1345	6227

TITLE OF INVENTION: METHOD FOR CALCULATING HIGH-RESOLUTION WAFER PARAMETER PROFILES

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1510	\$300	\$0	\$1810	03/01/2010

EXAMINER	ART UNIT	CLASS-SUBCLASS
JONES, HUGH M	2128	703-014000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
- ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

- (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, 1 \_\_\_\_\_
- (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 \_\_\_\_\_
- 3 \_\_\_\_\_

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☐ Issue Fee
- ☐ Publication Fee (No small entity discount permitted)
- ☐ Advance Order - # of Copies \_\_\_\_\_

4b. Payment of Fee(s); (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
- ☐ Payment by credit card. Form PTO-2038 is attached.
- ☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number \_\_\_\_\_ (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature \_\_\_\_\_

Date \_\_\_\_\_

Typed or printed name \_\_\_\_\_

Registration No. \_\_\_\_\_

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/736,386

12/15/2003

Bruce Whitefield

03-1345

6227

82346

7590

11/30/2009

EXAMINER

JONES, HUGH M

ART UNIT

PAPER NUMBER

2128

DATE MAILED: 11/30/2009

James R. Foley

Trexler, Bushnell, Giangiorgi, Blackstone & Marr,

105 West Adams Street

36th Floor

Chicago, IL 60603

## Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)

(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 629 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 629 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

**Notice of Allowability**

Application No.

10/736,386

Examiner

Hugh Jones

Applicant(s)

WHITEFIELD ET AL.

Art Unit

2128

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to 7/23/2009.
2. ☒ The allowed claim(s) is/are 1-21.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some\* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).
- \* Certified copies not received: \_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
- (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
- 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_.
- (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_.
- Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).**
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

**Attachment(s)**

- |  |   |
|--|---|
| 1. <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 5. <input type="checkbox"/> Notice of Informal Patent Application                     |
| 2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 6. <input type="checkbox"/> Interview Summary (PTO-413),<br>Paper No./Mail Date ____. |
| 3. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08),<br>Paper No./Mail Date ____     | 7. <input type="checkbox"/> Examiner's Amendment/Comment                              |
| 4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit<br>of Biological Material | 8. <input checked="" type="checkbox"/> Examiner's Statement of Reasons for Allowance  |
|  | 9. <input type="checkbox"/> Other ____.   |

## DETAILED ACTION

### *Introduction*

1. Claims 1-21 are pending. Claims 1-21 are allowed.

### *Allowable Subject Matter*

2. Claims 1-21 are allowed over the prior art of record.
3. The following is an examiner's statement of reasons for allowance:
4. Process claims 1-21 were analyzed under 35 USC 101. It is recognized that, in order to be statutory, a process claim must be 1) tied to a particular machine or apparatus, or 2) it transforms a particular article into a different state or thing. *In re Bilski*, 88 USPQ2d 1385 (2008). It is also recognized that a general purpose computer may be converted into a particular computer through the operation of software on the computer. *In re Alappat*, 31 USPQ2d 1545 (1994). For the instant invention, it is clear that the process must be carried out via software operating on a computer. The algorithm as described by claim 1 is too complicated to carry out without machine computation. Independent claim 1 requires at least a computer processor. As such, the process is tied to a particular machine and meets the *Bilski* test.
5. The claims are novel over the prior art of record. Independent claim 1 requires:
  1. A method for calculating high-resolution wafer parameter profiles comprising the steps of:
    - a) defining an appropriate product/device input dataset for a plurality of different die sizes and products, wherein the dataset comprises physical correlation reference points comprising information relating to the size of each die in two directions as

Art Unit: 2128

well as the location of at least one of the corners of each die;

b) collecting a die level yield bin dataset for one of the products/devices defined in step (a) by using the product/device input dataset to generate a table of data for the lots and wafers of said one of the products/devices with a virtual die coordinate for each die and a corresponding value;

c) calculating a single composite value for each said virtual die coordinate;

d) defining where on a virtual die it is desired to assign a composite value;

e) calculating physical coordinates for each die value using the corresponding virtual coordinate and a physical translation key;

f) repeating steps (b), (c), (d) and (e) for each of said die sizes and products defined in step (a);

g) merging the data from a plurality of files into one file;

h) defining a grid;

i) creating a table with all possible grid coordinates that would fit on a production wafer;

j) defining a smoothing algorithm;

k) calculating the smoothed value for each point of the grid from the combined data; and

l) plotting a wafer profile.

Most of the limitations have been *individually* disclosed in the prior art.

6. As for 'composite' data values in this context (limitation 'c', for example), see:

USPUB 20080021677:

[0165] IN THE PRESENT SYSTEM, THE COMPOSITE ANALYSIS ELEMENT 214 PERFORMS THE MERGING PROCESS USING AN APPROPRIATE PROCESS TO MERGE THE COMPOSITE MASK DATA WITH AN ORIGINAL MAP OF COMPOSITE DATA, SUCH AS A MAP OF COMPOSITE RAW DATA, COMPOSITE SIGNATURE DATA, OR COMPOSITE BIN DATA

[0152] THUS, THE PROXIMITY ENGINE MAY GENERATE A SET OF COMPOSITE MASK DATA ACCORDING TO ANY SUITABLE PROCESS OR TECHNIQUE. THE RESULTING COMPOSITE MASK DATA COMPRISES A SET OF DATA THAT CORRESPONDS TO THE RESULTS OF THE DATA POPULATION FOR EACH DATA POINT. CONSEQUENTLY, CHARACTERISTICS FOR THE DATA POINT MAY BE IDENTIFIED OVER MULTIPLE DATASETS. FOR EXAMPLE, IN THE PRESENT EMBODIMENT, THE COMPOSITE MASK DATA MAY ILLUSTRATE PARTICULAR DEVICE LOCATIONS THAT SHARE CHARACTERISTICS ON MULTIPLE WAFERS, SUCH AS WIDELY VARIABLE TEST RESULTS OR HIGH FAILURE RATES.

Also see US PUB 20080021677:

**Description of Disclosure - DETX (142):**

[0152] Thus, the proximity engine may generate a set of composite mask data according to any suitable process or technique. The resulting composite mask data comprises a set of data that corresponds to the results of the data population for each data point. Consequently, characteristics for the data point may be identified over multiple datasets. For example, in the present embodiment, the composite mask data may illustrate particular device locations that share characteristics on multiple wafers, such as widely variable test results or high failure rates. Such information may indicate issues or characteristics in the manufacturing or design process, and thus may be used to improve and control manufacturing and testing.

limitation g: merging: See US PUB 20080021677:

Art Unit: 2128

**Description of Disclosure - DETX (142):**

[0152] Thus, the proximity engine may generate a set of composite mask data according to any suitable process or technique. The resulting composite mask data comprises a set of data that corresponds to the results of the data population for each data point. Consequently, characteristics for the data point may be identified over multiple datasets. For example, in the present embodiment, the composite mask data may illustrate particular device locations that share characteristics on multiple wafers, such as widely variable test results or high failure rates. Such information may indicate issues or characteristics in the manufacturing or design process, and thus may be used to improve and control manufacturing and testing.

takes place, for example, when normalizing (known in the art, as will be discussed) data of different products.

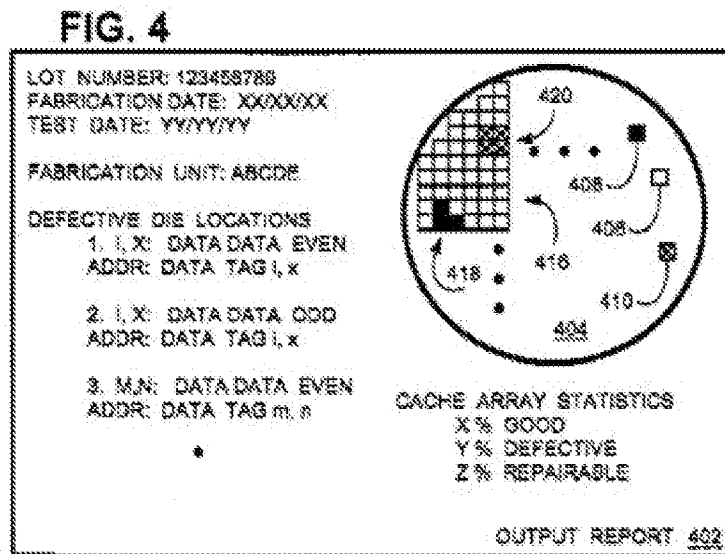
Limitations h, i: this refers to assigning acceptable dies. This would correspond to, for example, taking into account 'edge exclusion' effects. See, for example, col. 5 of US patent 6,070,004:

ACCEPTANCE TESTING.

The best overall yield is provided for a given wafer using the weighting of the yield probability curve. Rather than determining the maximum amount of chips per wafer based on a particular edge exclusion alone, chip yield data is used to adjust for the weighting of the location of the wafer map. Yield increases can range for example, from 1-3% for wafer sizes of eight inches although higher yields are contemplated. A chip located at a position that was normally rejected due to its location in an exclusion zone of a wafer can now be considered for use based on the yield probability associated with its position on the wafer. If the yield probability for the chip at this location is above an assigned threshold value the chip can be accepted for use, hence increasing the overall yield for a given wafer.

Also see fig. 4 of US PUB 2005 0039089:





The smoothing algorithm is admitted to be known - pg. 17, specification.

7. Normalization of composite data in this context is also known. See col. 7 of US Patent 6 847 855:

The introduction of a standard wafer with standard chips and the associated area normalization or the associated area-normalized wafer maps enables cross-product comparisons of wafer maps. Furthermore, the introduction of a standard wafer with standard chips significantly facilitates the identification of deviations caused by design, test technique, technology, process and production. The area-normalized yield which can be determined with the aid of the standard wafer may serve as a monitor for the so-called "yield" ("yield performance"). In this case, statements can be made with regard to the mean and the variance.

The introduction of a standard wafer with standard chips and the associated area normalization or the associated area-normalized wafer maps makes it possible to express technological differences between different process groups. By way of example, the product of the number  $n$ , of assumed critical planes, and  $D$ , the associated electrically effective defect density, can be calculated using the following formula:

Art Unit: 2128

8. However, these features, as combined and arranged *in the context of the claimed invention*, render the claims novel and non-obvious over the prior art of record.

There is no reasonable suggestion in the prior art to combine the elements.

9. Regarding the normalization procedure, the specification discloses: (Lines 1-4, pg. 12):

The method 100, further includes the step 108, which is to normalize the composite die values so that they can be merged with values from the other products, if necessary. For example, yields vary by product and die size and cannot be used together without normalization. ...

This would appear to suggest that step 'g' requires a merging after normalization, as described above. However, limitation 'g' only requires:

(g) merging the data from a plurality of files into one file;

and not necessarily merging all the files. In other words, normalization prior to merging is not required by claim 1, because claim 1 does not require that 1) all products be merged, and 2) all products need to be normalized (the selected products may be the same size, for example) to be merged. This can also be seen from consideration of claim 2 as well as claims 5, 8:

2. A method as defined in claim 1, further including the step of normalizing the composite die values so that they are mergeable with values from the other products.

Art Unit: 2128

5. A method as defined in claim 1, wherein said appropriate product/device input dataset of step (a) are defined by a variety of devices with die level data and different die sizes.

8. A method as defined in claim 1, wherein said appropriate product/device input dataset of step (a) are defined by die size for each device.

Also note that limitation 'f' f) repeating steps (b), (c), (d) and (e) for each of said die sizes and products defined in step (a);

10. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hugh Jones whose telephone number is (571) 272-3781. The examiner can normally be reached on M-Th.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamini Shah can be reached on (571) 272-2279. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

Art Unit: 2128

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Hugh Jones/

Primary Examiner, Art Unit 2128